EUROPEAN SPACE VEHICLE LAUNCHER DEVELOPMENT ORGANIZATION ACTIVE COMMUNICATIONS SATELLITES

by

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Directorate of Future Programs and Advanced Studies

Technical Memorandum No. F 37

Summary

The main data on active communications satellites, including those that have been launched and those on the drawing boards, are presented here in outline form.

Approved for publication:

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Directorate of Future Programs and Advanced Studies

ACTIVE COMMUNICATIONS SATELLITES

In this report we would like to present the main data for both launched and projected active communications satellites.

These data are arranged in the form of totals [file cards], giving the most important data for each satellite.

We distinguish two main areas here:

The civilian areas [networks] and the purely military areas.

This basic classification is determined by the particular sponsering agency which may be either under civilian or military authority.

Here is the list of satellites and projects given:

Relay 1, 2
Telstar 1, 2
Syncom 1, 2, 3
Early Bird — Intelsat 1
Lani 1
Blue Bird — Intelsat 2
Intelsat 3
Hughes Projects — H.S. 304 — H.S. 307
A.T.S. Projects — A.T.S. B, — A.T.S. E, — A.T.S. 4
TRW Projects -- medium altitude
R.C.A. Project 1, 2, 3
Molnya 1A, 1B, 1C, 1D
Eurospace Project
SAROS Project, French National Space Studies Center
Bölkow Olympia [West German] Project
ATLAS - SCORE
Courier 1B
LES 1, 2, 3, 4
I.D.C.S.P. (Initial Defense Communication System Programme)
A.D.C.S.P. (Advanced Defense Communication System Programme)
T.R.W. Project — Minicomsat

Country

U.S. TELSTAR I

Agency: NASA	Builder: Bell Telephone

GENERAL DATA

Weight: 77 kg	Height:
Shape: spherical, with facets	Diameter: 0.876 m
Launch Date: 10 July 1962	Booster: Thor Delta

ORBITAL DATA

Angle: 44.79	Cycle: 157.65 min
Apogee: 5,632 km	Perigee: 952 km
Lifetime: 7 months	Stabilization system: spin
Orbit correction method: electromagnetic	
Correction dates:	

Power Source: solar cells Si P = 15 W

WEIGHTS

Structure: 20 kg	Power Source: 20 kg
Stabilization system:	
Telecommunications Equipment: 17.5 kg + 8.3 kg telemetry and controls	

COMMUNICATIONS FACILITIES

Radiated Power: 2 W	Number of channels: 600 or 1 C T V
Antenna type: belt	Transmitter Frequency: 4169.72 Mc
Antenna Gain: 1 db	Receiver Frequency: 6389.58 Mc
Beam Opening:	

Cost: $50,000 cost of complete program

COMMENTS

Band width 50 Mc
Frequency modulation

Country

U.S. **TELSTAR II**

Agency: **NASA** | Builder: **Bell Telephone**

GENERAL DATA

Weight: **79.4 kg** | Height:

Shape: **spherical, with facets** | Diameter: **0.876 m**

Launch Date: **7 May 1963** | Booster: **Thor Delta**

ORBITAL DATA

Angle: **42.73** | Cycle: **225.05 min**

Apogee: **10,803 km** | Perigee: **974 km**

Lifetime: **2 years** | Stabilization system: **spin**

Orbit correction method:

Correction dates:

Power Source: **solar cells Si** **P = 16 W**

WEIGHTS

Structure: **21 kg** | Power Source: **20.5 kg**

Stabilization system:

Telecommunications Equipment: **17.5 kg + 8.3 kg telemetry and controls**

COMMUNICATIONS FACILITIES

Radiated Power: **2 W** | Number of channels: **600 or 1 TV**

Antenna type: **belt** | Transmitter Frequency: **4169.72 Mc**

Antenna Gain: **1 db** | Receiver Frequency: **6389.58 Mc**

Beam Opening:

Cost:

COMMENTS

Frequency modulation
Band width 50 Mc

Country

U.S. RELAY I

Agency: NASA	Builder: R.C.A.

GENERAL DATA

Weight: 78 kg	Height: 0.83 m
Shape: octagonal prism	Diameter: 0.74 m
Launch Date: 13 December 1962	Booster: Thor Delta

ORBITAL DATA

Angle: 47.49	Cycle: 185.01 min
Apogee: 7,439 km	Perigee: 1,322 km
Lifetime: 1 year	Stabilization system: spin

Orbit correction method: electromagnetic

Correction dates:

Power Source: solar cells Si P = 68 W

WEIGHTS

Structure: 13.9 kg	Power Source: 30.5 kg
Stabilization system: 1 kg	Experiments = 6.15 kg

Telecommunications Equipment: 17.15 kg + 8.15 kg telemetry and command

COMMUNICATIONS FACILITIES

Radiated Power: 10 W	Number of channels: 300 + 12 1 TV
Antenna type: concentric slot	Transmitter Frequency: TV 4170 Mc
Antenna Gain: 1 db	Receiver Frequency: TV 1725 Mc
Beam Opening:	

Cost: $ [illegible: 325,000 or: 3,250]

COMMENTS

Frequency modulation
Band width 20 Mc

1 receiver antenna, 26 m long

Country

U.S. RELAY II

Agency: NASA	Builder: R.C.A.

GENERAL DATA

Weight: 78 kg	Height: 0.83 m
Shape: octagonal prism	Diameter: 0.74 m
Launch Date: 21 January 1964	Booster: Thor Delta

ORBITAL DATA

Angle: 46.32°	Cycle: 194.60 min
Apogee: 7,411 km	Perigee: 2,091 km
Lifetime: 1 year	Stabilization system: spin
Orbit correction method: magnetic	
Correction dates:	

Power Source: solar cells Si P = 68 W

WEIGHTS

Structure: 13.9 kg	Power Source: 30.5 kg
Stabilization system: 1 kg	Experiments [tests] 6.5 kg
Telecommunications Equipment: 17.15 kg + 8.15 kg telemetry and control	

COMMUNICATIONS FACILITIES

Radiated Power: 10 W	Number of channels: 300 + 12 + ITV
Antenna type: concentric slots	Transmitter Frequency: 4170 Mc
Antenna Gain: 1 db	Receiver Frequency: 1725 Mc
Beam Opening:	

Cost: $3,250

COMMENTS

Country

U.S. SYNCOM I

Agency: NASA	Builder: Hughes

GENERAL DATA

Weight: 39 kg (with structure and apogee motor)	Height: 0.394 m
Shape: cylindrical	Diameter: 0.71 m
Launch Date: 14 February 1963	Booster: Thor Delta

ORBITAL DATA

Angle: 33.5	Cycle: 23 h 46 min 30 s
Apogee: 37,020 km	Perigee: 34,185 km
Lifetime: 5 hours	Stabilization system: spin

Orbit correction method: nitrogen + H_2 O_2

Correction dates:

Power Source: solar cells Si 25 W

WEIGHTS

Structure: 13.9 kg	Power Source: 5.25 kg
Stabilization system: 7 kg	
Telecommunications Equipment: 10.3 (including telemetry)	

COMMUNICATIONS FACILITIES

Radiated Power:	2 W	Number of channels:	11 50
Antenna type:	slot	Transmitter Frequency:	1814 Mc
Antenna Gain:	5.5 db	Receiver Frequency:	7360 Mc
Beam Opening:	23o		

Cost: entire program: $35,300, over a period of 4 years

COMMENTS

Contact lost 5 hours after launch -- useless

Country

U.S. SYNCOM II

Agency: NASA	Builder: Hughes

GENERAL DATA

Weight: 35.8	Height: 0.394 m
Shape: cylindrical	Diameter: 0.71 m
Launch Date: 26 July 1963	Booster: Thor Delta

ORBITAL DATA

Angle: 33.05	Cycle: 1,454 min
Apogee: 42,512 km	Perigee: 35,584 km
Lifetime: 605 days	Stabilization system: spin

Orbit correction method: nitrogen + H_2 O_2

Correction dates: 11, 12, 15, 16 August 1963 and January 1964

Power Source: solar cells Si P = 29 W

WEIGHTS

Structure: 13.9 + 4.35 kg	Power Source: 5.25 kg
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: 2 W	Number of channels: 50
Antenna type: slot antennas	Transmitter Frequency: 1,815 Mc
Antenna Gain: 5.9 db	Receiver Frequency: 7,360 Mc
Beam Opening: 25°	

Cost: $35,300, over a period of 4 years

COMMENTS

Weight of apogee motor 4.35 kg
Apogee motor preprogrammed
Band width 5 Mc

Country

U.S. SYNCOM III HS 301

Agency: NASA | Builder: Hughes

GENERAL DATA

Weight: 39 kg | Height: 0.384 m

Shape: cylindrical | Diameter: 0.71

Launch Date: 19 August 1964 | Booster: T.A. Delta

ORBITAL DATA

Angle: 0.10 | Cycle: 1,407.8 min

Apogee: 36,271 km | Perigee: 34,191 km

Lifetime: 514 days | Stabilization system: spin

Orbit correction method: H_2 O_2 (200 ms)

Correction dates: 21 August 1964 and 11 September 1964

Power Source: solar cells Si P = 31 W

WEIGHTS

Structure: | Power Source: 4.75 kg

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 2 W | Number of channels: 50

Antenna type: dipoles | Transmitter Frequency: 1815 Mc

Antenna Gain: 5.9 db | Receiver Frequency: 7360 Mc

Beam Opening: 25°

Cost: program: $35,300, over 4 years

COMMENTS

Apogee motor controlled from ~~the ground~~

Band width 13 Mc

Country

U.S. EARLY BIRD HS 303

Agency: NASA | Builder: Hughes

GENERAL DATA

Weight: 38.5 kg | Height: 0.54 m

Shape: cylindrical | Diameter: 0.71 cms

Launch Date: 6 April 1965 | Booster: T.A.D.

ORBITAL DATA

Angle: 0.13° | Cycle: 1,436.95 min

Apogee: 36,606 km | Perigee: 35,003 km

Lifetime: 3 years | Stabilization system: spin

Orbit correction method: $H_2 O_2$ (200 m/s)

Correction dates: 13 April and 14 April

Power Source: solar cells Si | P = 46 W

WEIGHTS

Structure: 6.80 kg + 4.35 kg | Power Source: 6.80 kg

Stabilization system: 7.45 kg

Telecommunications Equipment: 13 kg (telemetry included)

COMMUNICATIONS FACILITIES

Radiated Power: 6 W | Number of channels: 240 duplex or I.T.V.

Antenna type: donut | Transmitter Frequency: 4160.75/ Mc 4081

Antenna Gain: 9.4 db | Receiver Frequency: 63,989.97/ Mc 6001.02

Beam Opening: 11° - 7°

Cost: $3,350

COMMENTS

$H_2 O_2$ 100 m/s Intelsat I

The telemetry and the control are integrated with the receiver of the telecommunications [satellites]

Country

U.S. LANI 1 HS 303 A

Agency: NASA | Builder: Hughes

GENERAL DATA

Weight: 72.5 kg | Height: 0.666 m

Shape: cylindrical | Diameter: 1.422 m

Launch Date: 26 October 1966 | Booster: TAT Improved Delta

ORBITAL DATA

Angle: 16° | Cycle: 12 h

Apogee: 37,500 km | Perigee: 2,962 km

Lifetime: 5 years | Stabilization system: spin

Orbit correction method: H_2 O_2

Correction dates:

Power Source: solar cells Si | P = 85 W

WEIGHTS

Structure: | Power Source:

Stabilization system: 15 kg

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 18 W | Number of channels: 240

Antenna type: "despinned" | Transmitter Frequency:

Antenna Gain: 10 db | Receiver Frequency:

Beam Opening: 20°

Cost: $3,250

COMMENTS

Anticipated orbit: 24 hours, equatorial
Apogee motor functioned improperly (6s or 12s)

Country

U.S. BLUE BIRD HS 303 A

Agency: NASA | Builder: Hughes

GENERAL DATA

Weight: 72.5 kg | Height: 0.666 m

Shape: cylindrical | Diameter: 1.422 m

Launch Date: | Booster: TAT Improved Delta

ORBITAL DATA prevue

Angle: 0° | Cycle: 24 h

Apogee: | Perigee:

Lifetime: 5 years | Stabilization system: spin

Orbit correction method: H_2 O_2

Correction dates:

Power Source: solar cells Si - 85 W

WEIGHTS

Structure: | Power Source:

Stabilization system: 15 kg

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 18 W | Number of channels: 180

Antenna type: "despinned" | Transmitter Frequency:

Antenna Gain: 10 db | Receiver Frequency: 6283 - 6409 Mc

Beam Opening: 20°

Cost: $3,250

COMMENTS

Intelsat 2. or NASCOM or Apollo.

Country

U.S. Project INTELSAT 3

Agency:	Builder: TRW

GENERAL DATA

Weight: 110 kg	Height: 0.94 m
Shape: cylindrical	Diameter: 1.422 m
Launch Date: 1968	Booster: ATLAS Agena

ORBITAL DATA

Angle: 0°	Cycle: 24 h
Apogee: 36,000 km	Perigee: 36,000 km
Lifetime: 5 years	Stabilization system: spin

Orbit correction method: Hydrazine

Correction dates:

Power Source: solar cells Si P = 160 W

WEIGHTS

Structure: 37 kg	Power Source: 20 kg
Stabilization system: 26 kg	

Telecommunications Equipment: 23 kg with telemetry

COMMUNICATIONS FACILITIES

Radiated Power: 20 W	Number of channels: 1,200
Antenna type: "despinned"	Transmitter Frequency: 3700 4200 Mc
Antenna Gain: 13-14 db	Receiver Frequency: 5925 - 6425 Mc
Beam Opening: 20°	

Cost: $5,000

COMMENTS

Intelsat 3 or Global comsat

Country

U.S. H S 304 (Project Hughes) HS 304

Agency:	Builder: Atlas Agena D

GENERAL DATA

Weight: 159.5 kg	Height:
Shape: cylindrical	Diameter:
Launch Date:	Booster:

ORBITAL DATA

Angle:	Cycle:
Apogee:	Perigee:
Lifetime:	Stabilization system: spin

Orbit correction method: H_2 0 electrolysis

Correction dates:

Power Source: solar cells Si 100 W

WEIGHTS

Structure: 11.45 + 9.3 + 1	Power Source: 13, 1 kg
Stabilization system: 104.5 kg	
Telecommunications Equipment: 15.3	

COMMUNICATIONS FACILITIES

Radiated Power: 25 W	Number of channels: 1,200
Antenna type:	Transmitter Frequency:
Antenna Gain: 7 - 18 db	Receiver Frequency:
Beam Opening:	

Cost: $7,200, including launch cost

COMMENTS

Country

U.S. H S 307 (Project Hughes) HS 307

Agency: | Builder: Hughes

GENERAL DATA

Weight: 340 kg | Height: 3 m

Shape: cylindrical | Diameter: 2.70 min

Launch Date: | Booster: ATLAS Agena D

ORBITAL DATA

Angle: 0° | Cycle: 24 h

Apogee: 36,000 km | Perigee: 36,000 km

Lifetime: 10 years | Stabilization system: spin

Orbit correction method:

Correction dates:

Power Source: solar cells Si 550 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 100 W | Number of channels: 5 - 10,000

Antenna type: parabolic | Transmitter Frequency:

Antenna Gain: 17 - 20 db | Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

ERP = 40 dbw
Collective diffusion

Country

U.S. A.T.S.B HS 306

Agency: NASA | Builder: Hughes

GENERAL DATA

Weight: 350 kg | Height: 1.30 m

Shape: cylindrical | Diameter: 1.48 m

Launch Date: 1967 | Booster: ATLAS-Agena D

ORBITAL DATA

Angle: 0° | Cycle: 24 h

Apogee: 36,000 km | Perigee: 36,000 km

Lifetime: | Stabilization system: spin

Orbit correction method:

Correction dates:

Power Source: solar cells Si P = 200 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 30 W | Number of channels:

Antenna type: "despinned" | Transmitter Frequency:

Antenna Gain: 10 db | Receiver Frequency:

Beam Opening: 18°

Cost: $8,000

COMMENTS

S/N = 50 db
ERP = 35 dbw

Communications test between aircraft and satellites

Country

A.T.S.E

Agency:	Builder: **Hughes**

GENERAL DATA

Weight:	**350 kg**	Height:	**2 m**
Shape:	**cylindrical**	Diameter:	**1.48 m**
Launch Date:	**1967**	Booster:	**Titan 3C**

ORBITAL DATA

Angle:	Cycle:
Apogee:	Perigee:
Lifetime:	Stabilization system: **gravity gradient**
Orbit correction method:	
Correction dates:	

Power Source:	**Solar cells**	**210 W**

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power:	**40 W**	Number of channels:	
Antenna type:	**"despinned"**	Transmitter Frequency:	
Antenna Gain:	**19 db**	Receiver Frequency:	
Beam Opening:	**18°**		

Cost: **$8,000**

COMMENTS

ERP = 35 dbw
S/N = 50 db

Country

U.S. **A.T.S. 4 (Project Hughes)**

Agency:	Builder: **Hughes**

GENERAL DATA

Weight:	Height: **3 m**
Shape: **cylindrical**	Diameter: **3 m**
Launch Date:	Booster: **Titan 3C**

ORBITAL DATA

Angle: **0°**	Cycle: **24 h**
Apogee: **36,000 km**	Perigee: **36,000 km**
Lifetime:	Stabilization system: **gravity gradient**
Orbit correction method:	
Correction dates:	

Power Source: **solar cells** **850 W**

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power:	**160 W**	Number of channels:	
Antenna type:	**parabolic**	Transmitter Frequency:	
Antenna Gain:	**23 db**	Receiver Frequency:	
Beam Opening:			

Cost: **$8,000**

COMMENTS

ERP = 45 db w

Country

U.S. TRW Project (Medium Altitude)

Agency: | Builder: TRW

GENERAL DATA

Weight: 118 kg | Height: 0.864 m

Shape: cylindrical | Diameter: 1.46 m

Launch Date: | Booster:

ORBITAL DATA

Angle: | Cycle:

Apogee: 10,350 km | Perigee: 10,350 km

Lifetime: 5 years | Stabilization system: gravity gradient

Orbit correction method:

Correction dates:

Power Source: solar cells Si 73 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 8 W | Number of channels: 1,200

Antenna type: | Transmitter Frequency:

Antenna Gain: 7.1 db | Receiver Frequency:

Beam Opening: 60°

Cost:

COMMENTS

Country

U.S. Project RCA 1

Agency:	Builder: R.C.A.

GENERAL DATA

Weight: 1590 kg	Height:
Shape: Pegase [French Pegasus] satellite	Diameter:
Launch Date:	Booster: Titan III C

ORBITAL DATA

Angle: 0°	Cycle: 24 h
Apogee: 36,000 km	Perigee: 36,000 km
Lifetime: 3 years	Stabilization system:
Orbit correction method:	
Correction dates:	

Power Source: solar cells 12 kw

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: 3 kw	Number of channels:
Antenna type: parabolic	Transmitter Frequency: 800 Mc
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost: $40,000

COMMENTS

Direct telediffusion

Country

U.S. **Project RCA 2**

Agency:	Builder: **R.C.A.**

GENERAL DATA

Weight: **3180 kg**	Height:
Shape: **Pegase [French Pegasus] satellite**	Diameter:
Launch Date:	Booster: **Saturn 1 B Centaur**

ORBITAL DATA

Angle: **0°**	Cycle: **24 h**
Apogee: **36,000 km**	Perigee: **36,000 km**
Lifetime: **3 years**	Stabilization system: **3 axes**
Orbit correction method:	
Correction dates:	

Power Source: **solar cells** **18 kw**

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: **5 kw**	Number of channels:
Antenna type: **parabolic**	Transmitter Frequency:
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost: **$40,000**

COMMENTS

Direct telediffusion

Country

U.S. Project RCA 3

Agency: | Builder: R.C.A.

GENERAL DATA

Weight: 2,732 kg | Height: 15.5 m

Shape: conical | Diameter:

Launch Date: | Booster: ATLAS Centaur

ORBITAL DATA

Angle: 0° | Cycle: 24 h

Apogee: 36,000 km | Perigee: 36,000 km

Lifetime: 3 years | Stabilization system:

Orbit correction method:

Correction dates:

Power Source: nuclear reactor 60 kw

WEIGHTS

Structure: | Power Source: 1,814 kg

Stabilization system:

Telecommunications Equipment: 736 kg

COMMUNICATIONS FACILITIES

Radiated Power: | Number of channels: 27,000

Antenna type: parabolic | Transmitter Frequency: 750 Mc

Antenna Gain: | Receiver Frequency:

Beam Opening: 18°

Cost:

COMMENTS

electric propulsion -- parking weight 3,764 kg

Country

USSR MOLNYA 1A

Agency: Academy of Sciences | Builder:

GENERAL DATA

Weight: 1,000 kg | Height:

Shape: cross-shaped | Diameter:

Launch Date: 23 April 1965 | Booster:

ORBITAL DATA

Angle: 65° | Cycle: 12 h

Apogee: 39,975 km | Perigee: 548 km

Lifetime: | Stabilization system:

Orbit correction method: liquid propergol

Correction dates: 2 May 1965

Power Source: Solar cells P = 300 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 40 W | Number of channels:

Antenna type: parabolic | Transmitter Frequency:

Antenna Gain: 19 db | Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

No sound channel with T.V.

Country

USSR MOLNYA 1B

Agency: **Academy of Sciences** | Builder:

GENERAL DATA

Weight: **1 t** | Height:

Shape: **cross-shaped** | Diameter:

Launch Date: **14 October 1965** Booster:

ORBITAL DATA

Angle: **65.19°** Cycle: **12 h**

Apogee: **39,935 km** Perigee: **481 km**

Lifetime: Stabilization system:

Orbit correction method:

Correction dates:

Power Source: **solar cells Si** **P = 300 W**

WEIGHTS

Structure: Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: **40 W** Number of channels:

Antenna type: **parabolic** Transmitter Frequency:

Antenna Gain: **19 db** Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

No sound channel with T.V.

Country

USSR MOLNYA 1C

Agency:	Builder:

GENERAL DATA

Weight: 1 t	Height:
Shape: cross-shaped	Diameter:
Launch Date: 24 April 1966	Booster:

ORBITAL DATA

Angle: 65.04° Cycle: 12 h

Apogee: 39,492 km Perigee: 506 km

Lifetime: Stabilization system:

Orbit correction method:

Correction dates:

Power Source: solar cells 300 W

WEIGHTS

Structure: Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 40 - 60 W Number of channels:

Antenna type: parabolic Transmitter Frequency:

Antenna Gain: Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Country

MOLNYA 1D

Agency:	Builder:

GENERAL DATA

Weight: 1 t	Height:
Shape: cross-shaped	Diameter:
Launch Date: 20 October 1966	Booster:

ORBITAL DATA

Angle: 65°	Cycle: 12 h
Apogee: 40,000 km	Perigee: 485 km
Lifetime:	Stabilization system:
Orbit correction method:	
Correction dates:	

Power Source: solar cells P = 300 W

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: 40 W	Number of channels:
Antenna type: parabolic	Transmitter Frequency:
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost:

COMMENTS

Country

Project EUROSPACE

Agency:	Builder:

GENERAL DATA

Weight: **470 kg**	Height:
Shape:	Diameter:
Launch Date:	Booster: **ELDO B**

ORBITAL DATA

Angle: **0°**	Cycle: **24 h**
Apogee: **36,000 km**	Perigee: **36,000 km**
Lifetime: **6 years**	Stabilization system: **3 axes**
Orbit correction method:	
Correction dates:	

Power Source: **solar cells 600 W**

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment: **50 kg**	

COMMUNICATIONS FACILITIES

Radiated Power: **100 W**	Number of channels:
Antenna type: **parabolic**	Transmitter Frequency: **4000 Mc**
Antenna Gain: **30 db**	Receiver Frequency: **6000 Mc**
Beam Opening: **5°**	

Cost:

COMMENTS

Distribution of television programs.

COMMUNICATIONS SATELLITES

Country

France

SAROS (Project of the French National Space Studies Center)

Agency:

Builder:

GENERAL DATA

Weight:

Height:

Shape:

Diameter:

Launch Date:

Booster: **ELDO PAS**

ORBITAL DATA

Angle: **0°**

Cycle: **24 h**

Apogee: **36,000 km**

Perigee: **36,000 km**

Lifetime:

Stabilization system:

Orbit correction method: **Hydrazine or N_2O_4 - MMH**

Correction dates:

Power Source: **solar cells Si** **100 W**

WEIGHTS

Structure:

Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power:

Number of channels:

Antenna type:

Transmitter Frequency:

Antenna Gain:

Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Country

West Germany **OLYMPIA (Project)**

Agency:	Builder: **Bölkow**

GENERAL DATA

Weight: **150 - 500 kg**	Height:
Shape:	Diameter:
Launch Date: **1972**	Booster: **ELDO PAS**

ORBITAL DATA

Angle: **0°**	Cycle: **24 h**
Apogee: **36,000 km**	Perigee: **36,000 km**
Lifetime:	Stabilization system:
Orbit correction method:	
Correction dates:	

Power Source:

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: **20 - 50 W**	Number of channels: **720 - 1,200**
Antenna type:	Transmitter Frequency:
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost: **project: $20,000-30,000**

COMMENTS

MILITARY COMMUNICATIONS SATELLITES

Country

U.S. ATLAS - SCORE

Agency: U.S. Army	Builder: U.S. Signal Corps

GENERAL DATA

Weight: 3.900 T+Mu = 69.5 kg	Height: 2.5 m
Shape: cylindrical	Diameter: 3 m
Launch Date: 18 December 1958	Booster: ATLAS B

ORBITAL DATA

Angle: 32.3°	Cycle: 101.47 min
Apogee: 1,484 km	Perigee: 185 km
Lifetime: 21 days	Stabilization system:
Orbit correction method:	
Correction dates:	

Power Source: Batteries Ag - Z_N - Mercury - 8 W

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment: 31.6 kg	

COMMUNICATIONS FACILITIES

Radiated Power: 8 W	Number of channels:
Antenna type: radiating slots	Transmitter Frequency: 132 - 905 Mc
Antenna Gain: + 1 db	Receiver Frequency: 132 - 435 Mc
Beam Opening:	

Cost: $200,000

COMMENTS

Country

U.S. COURIER 1B

Agency: U.S. Army	Builder: Philco

GENERAL DATA

Weight: 230 kg	Height: 1.295 m
Shape: spherical	Diameter: 1.295 m
Launch Date: 4 October 1960	Booster: Thor-ABLESTAR

ORBITAL DATA

Angle: 28.33°	Cycle: 106.85 min
Apogee: 1,237 km	Perigee: 938 km
Lifetime: 18 days	Stabilization system: spin

Orbit correction method:

Correction dates:

Power Source: solar cells Si P = 75 W

WEIGHTS

Structure: 94 kg Power Source:

Stabilization system: spin

Telecommunications Equipment: (136 kg electronics)

COMMUNICATIONS FACILITIES

Radiated Power: 5 W	Number of channels: 16
Antenna type: belt (2)	Transmitter Frequency: 1700 Mc 2400 Mc
Antenna Gain: 4 db	Receiver Frequency: 1700 Mc 2400 Mc
Beam Opening: 19°	

Cost:

COMMENTS

Frequency modulation
Band width 50 kc

Country

U.S. L.E.S. I

Agency: U.S.A.F. | Builder: Lincoln Laboratory

GENERAL DATA

Weight: 31 kg | Height:

Shape: polyhedral | Diameter: 0.61 m

Launch Date: 11 December 1965 Booster: Titan 3 A

ORBITAL DATA

Angle: 32.15 Cycle: 145.55 min

Apogee: 2,810 km Perigee: 2,774 km

Lifetime: 2 years Stabilization system: spin

Orbit correction method: magnetic

Correction dates:

Power Source: solar cells Si 26 W

WEIGHTS

Structure: Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 8 W Number of channels:

Antenna type: eight feeder horn antennas Transmitter Frequency:

Antenna Gain: Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Multiple technical access [uses]

Country

U.S. L.E.S. 2

Agency: U.S.A.F. | Builder: Lincoln Laboratory

GENERAL DATA

Weight: 37 kg | Height:

Shape: polyhedral | Diameter: 0.61 m

Launch Date: 6 May 1965 | Booster: Titan 3 A

ORBITAL DATA

Angle: 31.36° | Cycle: 315.16 min

Apogee: 15,102 km | Perigee: 2,828 km

Lifetime: | Stabilization system: spin

Orbit correction method:

Correction dates:

Power Source: solar cells Si 26 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 8 W | Number of channels:

Antenna type: eight feeder horn antennas | Transmitter Frequency:

Antenna Gain: | Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Multiple technical access

Country

U.S. L.E.S. 3

Agency: U.S.A.F.	Builder: Lincoln Laboratory

GENERAL DATA

Weight: 16 kg	Height:
Shape: polyhedral, 18 faces [sides]	Diameter: 0.61 m
Launch Date: 21 December 1965	Booster: Titan 3C

ORBITAL DATA

Angle: 26.46	Cycle: 581.41 min
Apogee: 33,177 km	Perigee: 195 km
Lifetime:	Stabilization system: spin
Orbit correction method:	
Correction dates:	

Power Source: solar cells Si

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power: 8 W	Number of channels:
Antenna type:	Transmitter Frequency:
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost:

COMMENTS

Multiple technical access

Country

U.S. L.E.S. 4

Agency: U.S.A.F.	Builder: Lincoln Laboratory

GENERAL DATA

Weight: 52 kg	Height: 0.91 m
Shape:	Diameter: 0.85 m
Launch Date: 21 December 1965	Booster: Titan 3 C

ORBITAL DATA

Angle: 26.60° Cycle: 589.24 min

Apogee: 33,362 km Perigee: 189 km

Lifetime: Stabilization system: spin

Orbit correction method: magnetic

Correction dates:

Power Source: solar cells Si

WEIGHTS

Structure: Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 8 W Number of channels:

Antenna type: feeder horn Transmitter Frequency: 8000 Mc

Antenna Gain: Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Country

U.S. I.D.C.S.P.

Agency: U.S.A.F. | Builder: Philco

GENERAL DATA

Weight: 45 kg | Height: 0.80 m

Shape: polyhedral, 24 sides | Diameter: 0.915 m

Launch Date: 15 June 1966 | Booster: Titan 3C

ORBITAL DATA

Angle: 0.25° | Cycle: 22 h

Apogee: 32,930 km | Perigee: 32,700 km

Lifetime: 3 years | Stabilization system: spin

Orbit correction method:

Correction dates:

Power Source: solar cells Si 43 W

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 3 W | Number of channels:

Antenna type: biconical | Transmitter Frequency: 7250 - 7300 Mc

Antenna Gain: 5 db | Receiver Frequency: 7975 - 8025 Mc

Beam Opening: 28°

Cost: $1,500

COMMENTS

Network of 22 satellites

COMMUNICATIONS SATELLITES

Country

U.S. | A.D.C.S.P. | HS 305

Agency: | Builder: Hughes

GENERAL DATA

Weight: | Height:

Shape: | Diameter:

Launch Date: 1970 | Booster:

ORBITAL DATA

Angle: | Cycle:

Apogee: | Perigee:

Lifetime: | Stabilization system:

Orbit correction method:

Correction dates:

Power Source:

WEIGHTS

Structure: | Power Source:

Stabilization system:

Telecommunications Equipment:

COMMUNICATIONS FACILITIES

Radiated Power: 18 W | Number of channels:

Antenna type: | Transmitter Frequency:

Antenna Gain: | Receiver Frequency:

Beam Opening:

Cost:

COMMENTS

Country

U.S. MINI - COM (Project T.R.W.)

Agency: U.S.A.F.	Builder T.R.W.

GENERAL DATA

Weight: 0.7 - 3.4 kg	Height:
Shape: tetrahedral	Diameter:
Launch Date:	Booster:

ORBITAL DATA

Angle:	Cycle:
Apogee:	Perigee:
Lifetime:	Stabilization system:
Orbit correction method:	
Correction dates:	

Power Source: solar cells Si 0.8 - 2.4 W

WEIGHTS

Structure:	Power Source:
Stabilization system:	
Telecommunications Equipment:	

COMMUNICATIONS FACILITIES

Radiated Power:	Number of channels:
Antenna type:	Transmitter Frequency:
Antenna Gain:	Receiver Frequency:
Beam Opening:	

Cost:

COMMENTS

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